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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|---|-------------|----------------------|---------------------|------------------|
| 10/650,940 | 08/27/2003 | Jae-Woo Roh | DE-1502 | 8090 |
| 1109 | 7590 | 03/31/2005 | EXAMINER | |
| ANDERSON, KILL & OLICK, P.C. 1251 AVENUE OF THE AMERICAS NEW YORK,, NY 10020-1182 | | | CHANG, AUDREY Y | |
| | | | ART UNIT | PAPER NUMBER |
| | | | 2872 | |

DATE MAILED: 03/31/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

| | | | |
|------------------------------|-----------------|--------------|--|
| Office Action Summary | Application No. | Applicant(s) | |
| | 10/650,940 | ROH, JAE-WOO | |
| | Examiner | Art Unit | |
| | Audrey Y. Chang | 2872 | |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 19 November 2004.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-8 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-8 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 04 January 2005 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Remark

- This Office Action is in response to applicant's amendment filed on November 19, 2004 which has been entered into the file.
- By this amendment, the applicant has amended claims 1 and 5 and has newly added claims 7-8.
- Claims 1-8 remain pending in this application.
- The objections to claims 1-6 set forth in the previous Office Action set forth in the previous Office Action are withdrawn in response to the amendment.

Drawings

1. The drawings were received on January 4, 2005. These drawings are approved.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claim 1 and newly added claims 7-8 are rejected under 35 U.S.C. 103(a) as being unpatentable over the patent issued to Tanaka et al (PN. 6,256,281) in view of the patent issued to Heanue et al (PN. 6,040,930).

Claim 1 has been amended significantly which necessitates the new grounds of rejections.

Tanaka et al teaches a *volume holographic memory system for digital data storage* (Figure 1), wherein the system comprises a *laser light source* (1), a *translucent mirror* (3), serves as the *beam splitter* for separating the laser light beam into a *signal beam* (4) and a *reference beam* (5), and a *spatial light modulator* (8) controlled by a *controller* (30) for modulating the signal light beam to provide *digital data* to be recorded that includes *binary coding* on a *page by page* basis to be imparted on the signal beam (please see column 7 lines 52-64). The system further comprises a *second spatial light modulator* (52'), serves as the *beam selecting means*, that is placed in the optical path of the reference beam wherein the second spatial light modulator comprises *optically transparent portions* and *opaque portions*, (Figure 2), which *partially* blocks the reference beam to transmit a *selected portion* of the reference beam. The transmitted reference beam is therefore a *reduced reference beam*. The reduced reference beam is then propagated to a reflecting mirror (12) and to be directed to a *recording medium*, (10, Figure 10, columns 6-9).

Claim 1 has been amended to include the feature of having a lens for *refracting* the reduced reference beam into the storage medium. The Tanaka et al reference has met all the limitations of the claim with the exception that it does not teach explicitly that a *lens* is used to *refract* the reduced reference beam to the recording or storage medium. However it is very well known in the art to use a lens to *refract* the reference beam into a storage medium as demonstrated by the teachings of Heanue et al, as shown in Figure 1, wherein a *lens* (50b) is used to *refract* the reference beam (32) after being reflected by a mirror (48a) into the recording medium (22). Heanue et al teaches *explicitly* that by having this arrangement a *spatially multiplexed holographic storage* can be achieved and the *packing density* of the holograms recorded in the medium can be *optimized*, (please see columns 1, lines 54-67, column 3, and column 7, lines 45-47). It would then have been obvious to one skilled in the art to apply the teachings of Heanue et al to modify the holographic memory system of Tanaka et al for the benefit of optimizing the packing density of the holograms capable being recorded in the memory medium.

With regard to claims 7 and 8, Tanaka et al teaches that the volume holographic memory system further comprises a *reference beam control* (33, Figure 1) for *fixing* the reflecting means or the mirror in a predetermined position. This also controls the incident locations of the reference beam on the recording medium. The modulation of the reference beam to provide reduced reference beams is controlled by the spatial light modulator, (52). Tanaka et al teaches that during the holographic recording process both the *position* of the reflecting means or the mirror and *therefore the incident positions of the reference beam* onto the recording medium and the *reduced* reference beam generated by the spatial light modulator are **changed** so that different interference patterns between the reduced reference beam and the signal beam can be recorded in a systematic fashion and the holograms or the interference patterns are recoded in a spatially and angularly multiplexed fashion. The order of changing the reflecting means and changing the reduced reference beam does not change the result to the holograms being recorded.

4. **Claim 2 is rejected under 35 U.S.C. 103(a) as being unpatentable over the patents issued to Tanaka et al and Heanue et al as applied to claim 1 above, and further in view of the patent issued to Davis (PN. 6,486,982).**

The volume holographic memory system for digital data recording taught by Tanaka et al in combination of the teachings of Heanue et al have met all the limitations of the claims. Tanaka et al teaches that the second spatial light modulator serves as the beam selection means may be made of transparent glass plate coated with black paint to provide the optically transparent and optically opaque portions, (please see column 8, lines 42-49). Tanaka et al also teaches that this beam selection means may be provided by using a *liquid crystal shutter panel* such that the extend of the reference beam or beam shape may be *electrically controlled*, (column 8, lines 51-65). It is implicitly true that the LCD shutter may be switched between ON (transparent) and OFF (opaque) state to allow transmission or blockage of the light beam. This beam selecting means, either of black paint coated glass plate or LCD

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shutter panel, serves as the iris wherein transmission regions may be changed, (either manually or electrically). However this reference does not teach *explicitly* to use an *actuator* for changing the position of the transmission region of the iris. Davis in the same field of endeavor teaches to use a *limiting aperture* (208, Figures 2 and 7), in either path of the reference light beam or signal light beam in a holographic data recording system, to shape the beam, wherein the limiting aperture has different transparent and opaque regions and a *motor* is used to move the limiting aperture to change the positions of the transparent regions, (please see column 10). It would then have been obvious to one skilled in the art to apply the teachings of Davis to use motor as actuator to move and select the desired transmitting regions of the beam selecting means for the benefit of providing a mechanical means with mechanical control to adjust and control the beam shape of the reduced reference beam.

5. Claims 3-6 are rejected under 35 U.S.C. 103(a) as being unpatentable over the patents issued to Tanaka et al, Heanue et al and Davis as applied to claim 2 above, and further in view of the patent issued to Hays et al (PN. 5,777,760).

The volume holographic memory system taught by Tanaka et al in combination with the teachings of Heanue et al and Davis as described for claims 1 and 2 above have met all the limitations of the claims.

With regard to claims 3-4, Tanaka et al teaches to use a reflecting mirror (12) with a reference beam control driver (33) as an actuator (33) to move the reflecting mirror (12, Figure 1), this mirror serves as the second mirror. However this reference does not teach explicitly to use an additional reflecting mirror, (as the first mirror). However using reflecting mirror as means to redirect light beam is a common practice in the art. Hays et al (Figure 10) teaches an arrangement of using a first and second reflecting mirror (33 and 35) with an actuator (41) to control the position of the second mirror (33) to direct the reference beam toward the lens (37). It would then have been obvious to one skilled in the art

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to apply the teachings of Hays et al as an alternative arrangement for the hologram memory system for the benefit of have more direction control of the reference beam.

It is implicitly true that the movement of the iris, i.e. movement of the transparent regions of the beam selecting means, is on a two dimensional plane, either by the manual means, electrical means of Tanaka et al or the mechanical means of Davis and the two-dimensional plane is perpendicular to the direction of the reference beam, (please see Figure 1 of Tanaka et al). It is further an obvious modification to one skilled in the art to make the incident direction of the reference beam on the lens to be the same for the benefit of maintaining the incident direction of the reference beam on the recording medium as shown by admitted prior art. With regard to claim 6, although these references do not teach explicitly to have an actuator to control the position of the first mirror, such modifications would have been obvious to one skilled in the art for the benefit of adding additional control to the direction of the reference beam.

Response to Arguments

6. Applicant's arguments with respect to amended claims 1-6 have been considered but are moot in view of the new ground(s) of rejection.

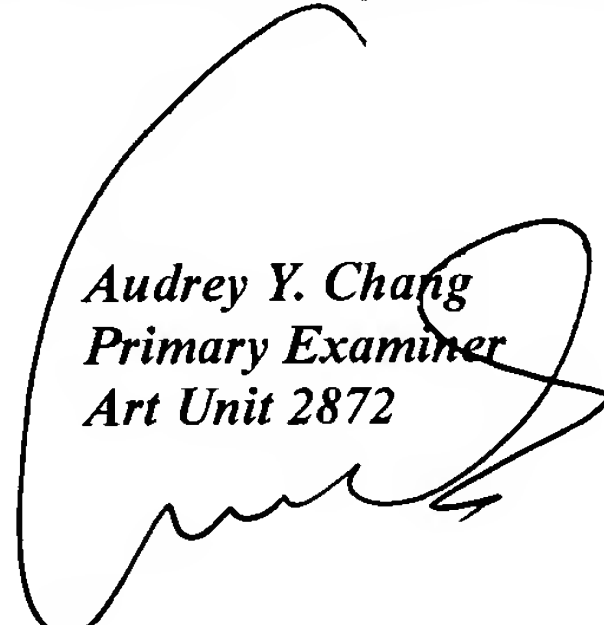
7. In response to applicant's arguments which states that the cited Tanaka et al reference teaches the difficulty of using lenses to shape the reference beam in spatial multiple recording, the applicant is respectfully directed to the cited reference Heanue et al which teaches *explicitly* to use lens to refract the reference beam in a *spatial multiple recording arrangement* for providing *optimized* hologram recording density.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Audrey Y. Chang whose telephone number is 571-272-2309. The examiner can normally be reached on Monday-Friday (8:00-4:30), alternative Mondays off.

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Drew Dunn can be reached on 571-272-2312. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Audrey Y. Chang
Primary Examiner
Art Unit 2872

A. Chang, Ph.D.